



# Nebraska Wind & Solar Conference

## *Solar + Storage*



*Building For The Future*

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November 13<sup>th</sup>, 2017

# Outline

- MC Power Background
- Solar Farm Considerations
- Reasons and Methods for Energy Storage
- Solar + Battery Storage
- Closing Thoughts

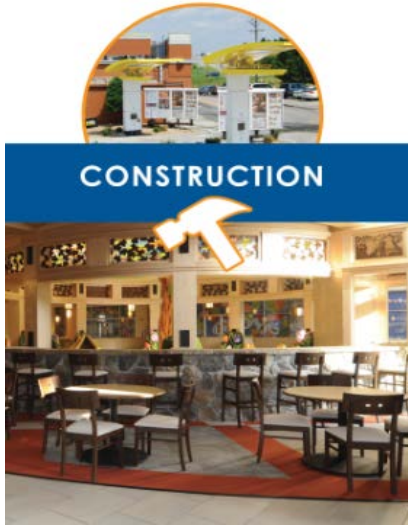


# Introduction

- MC Power Companies
  - Formed in 2009
- Unique Position:
  - Solar Developer / Engineering / Construction / O&M / Community Solar
- Superior Team: Trained and Certified
- Keys to Success: Community / Partnership
- Relationships: Position of Strength



# MC Power Companies



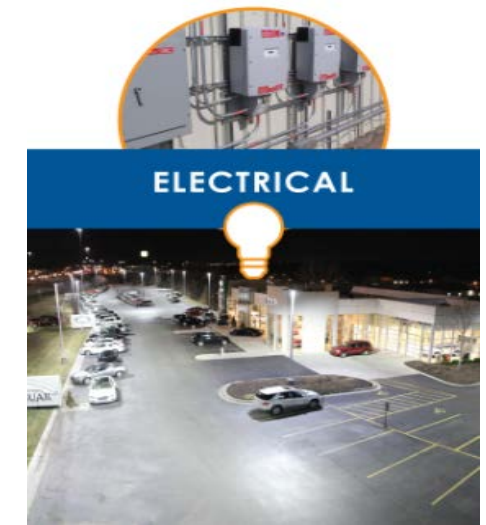
Since day one, we have had one vision, one focus - to build strong relationships with our clients.

Whether it is a large-scale, ground-up construction project, renovation or improvement, MC Power Companies is experienced and capable to take it on.



We offer business owners and utility organizations a turn-key solution for their solar energy needs.

Whether it's to broaden their energy portfolio or to ensure stable, predictable energy costs into the future, we lead the project every step of the way.



To complement our solar and construction entities we employ full-time journeymen and master electricians.

These highly skilled professionals provide our clients with superior service on every job. From lighting upgrades to design build electrical projects



# The Solar Portfolio

- Over 80 MW in projects completed / under contract
  - National Recognition: California, North & South Carolina, Missouri, Kansas, Minnesota & Texas
- Key Relationships



# Constructed Solar Farms

Butler, MO



Macon, MO



Trenton, MO



Rolla, MO



Waynesville, MO



Marshall, MO



# Constructed Solar Farms (Cont.)

Chillicothe, MO



Lebanon, MO



BPU KC, KS



IPL Phase I



# Under Construction



Nixa, MO  
7.92MW AC / 11.15MW DC  
33,288 335W Panels

**November 14<sup>th</sup>**  
**Dedication**



# MC Power Commercial & Industrial Systems

DST - CA



IKEA - KS



Interstate Studios -MO



Country Club Suites -MO



Pettis County - MO



Starline Brass - MO



Target & Kohl's - NC



Ditzfeld - MO



# Why Utilities Consider Solar?

- Power Generation Diversity
- Predictable Energy Costs (PPA)
- State RPS and Mandates
- Community Environmental Goals
- To mitigate the impact of RTS (Roof Top Solar)



# What Are Utilities Doing?

- **Third Party PPA Development**

- Partnership with utility and project development team
- Capture the benefits of tax credits
- Minimal risk to Offtaker
- Wholesale Solar

- **Building Solar Power Plants**

- Cost Socialization to all consumers (Cross Subsidization)
- Funding through capital reserves and financing
- Internal Resources utilized to construct solar farms



# What Are Utilities Doing? (Cont.)

- **Community Solar**

- Minimize utilities capital outlay
- Predictable long-term cost of energy
- Gives end users the ability of having solar without taking away revenue from municipality (helps avoid rooftop solar installations)
- Helping Consumers meet internal carbon goals
- To encourage expansion of Renewable Portfolio Standards to Municipals

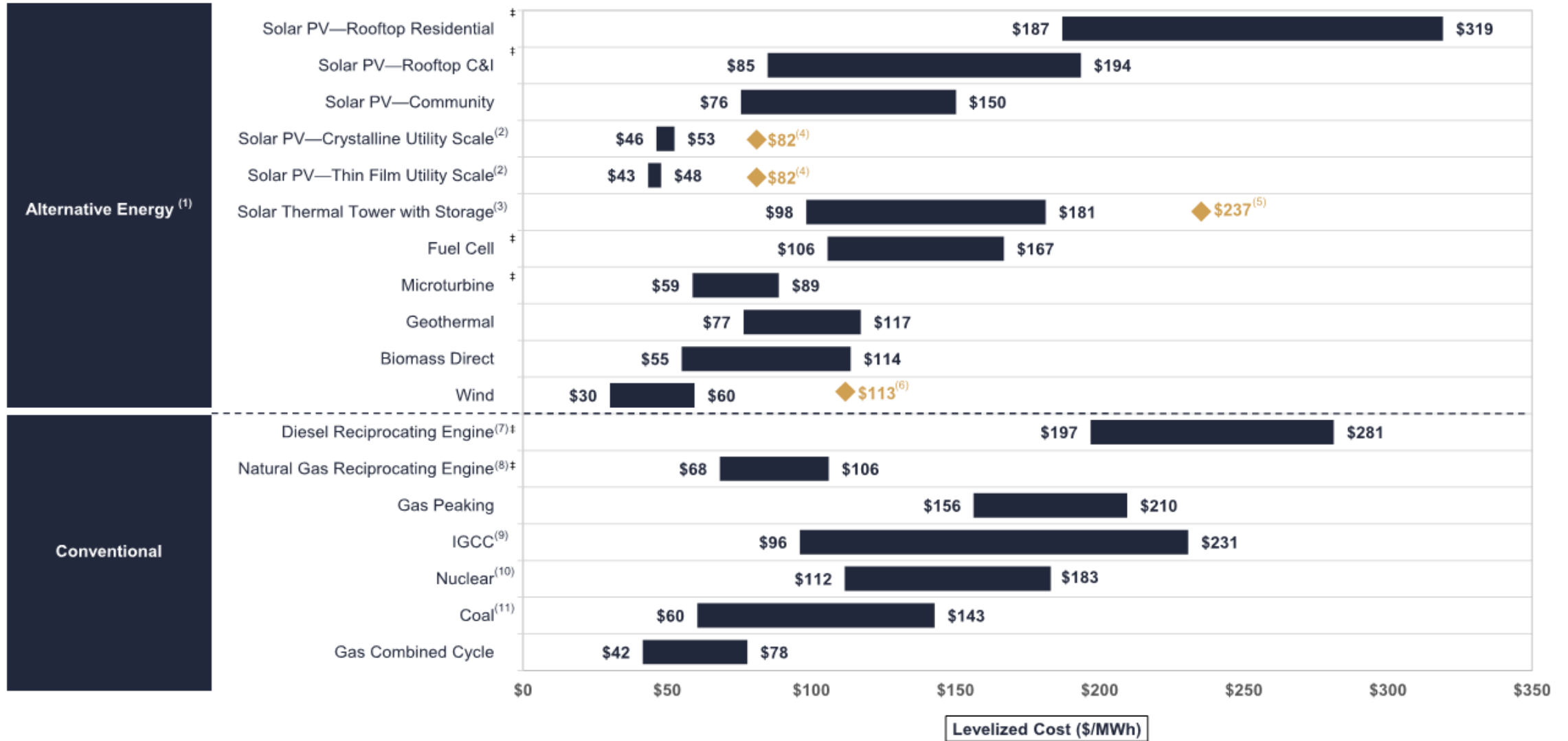


# Solar Farm Considerations

- Site Visibility for Community Support
- Economic Development Catalyst
- Need Strong Financial Partner / Ownership Transfer Plan
- Promote Early / Educate Public



# Unsubsidized Levelized Cost of Energy Comparison

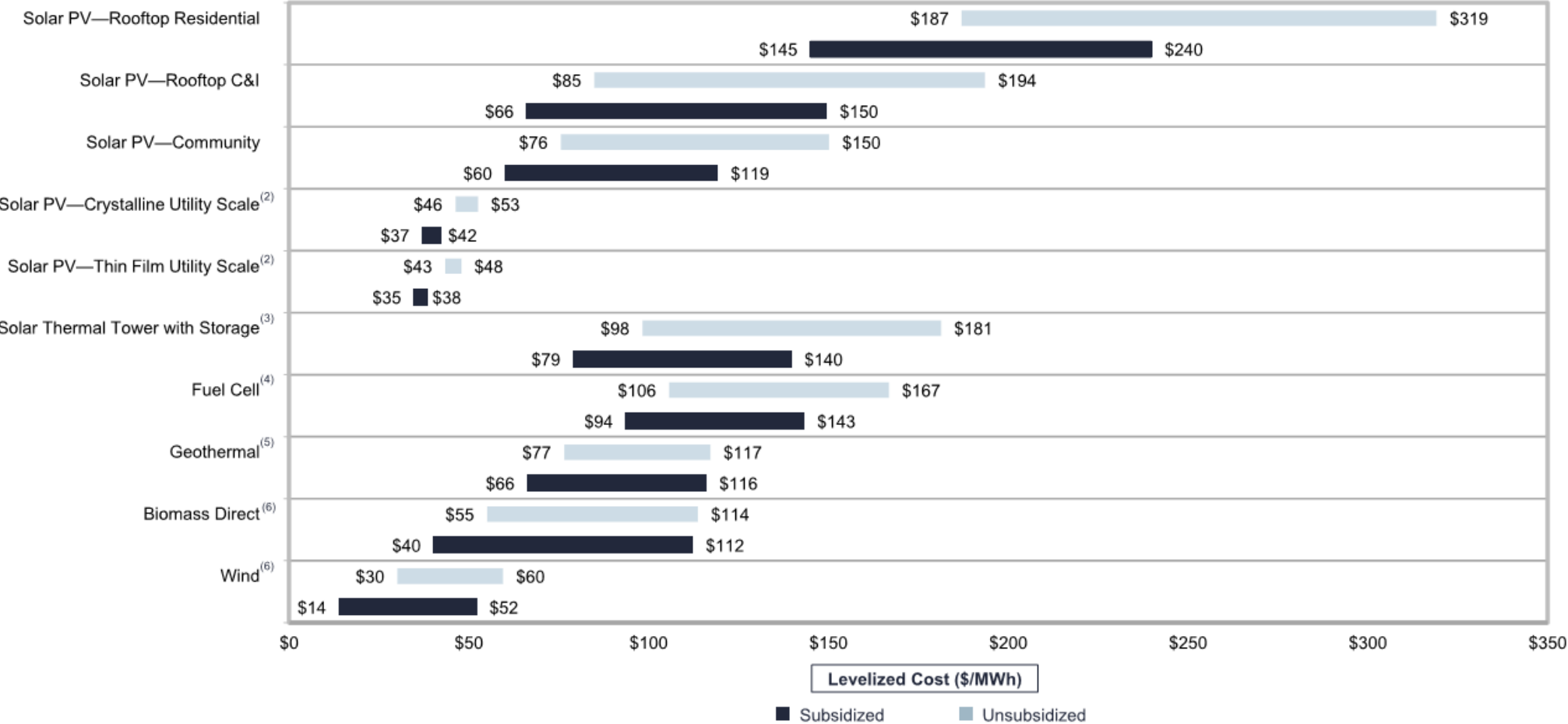


Source: Lazard estimates.



# Levelized Cost of Energy—Sensitivity to U.S. Federal Tax Subsidies<sup>(1)</sup>

Given the extension of the Investment Tax Credit (“ITC”) and Production Tax Credit (“PTC”) in December 2015 and resulting subsidy visibility, U.S. federal tax subsidies remain an important component of the economics of Alternative Energy generation technologies (and government incentives are, generally, currently important in all regions)



Source: Lazard estimates.



# Reasons for Energy Storage

## Generation

- Frequency Regulation
- Renewable Integration
- Spinning Reserve
- Power Plant Hybridization
- Ramp Rate Management
- Off-to-On Peak Intermittent Energy Smoothing & Shaping
- Ancillary Service Provision
- Black Start Provision
- Peak Demand Support

## Distribution

- Uninterruptible Power Supply
- Microgrid and Island Grid Support
- Community Energy Storage
- Grid-Connected PV Integration

## Transmission

- Upgrade Deferral
- Voltage Support
- Renewable Integration
- Dynamic Stability Support
- Loss Reduction
- Congestion Relief



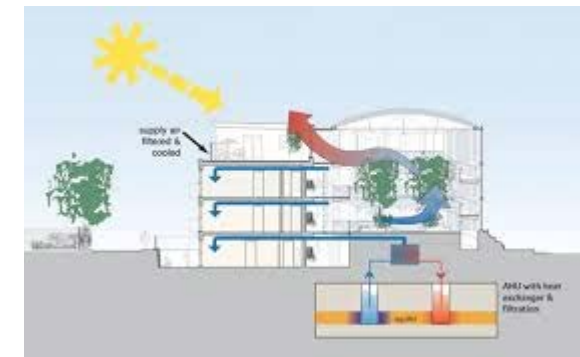
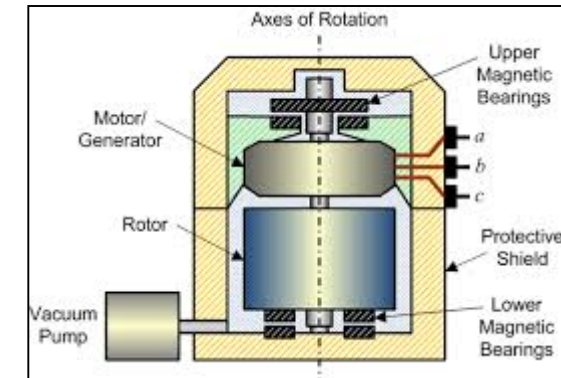
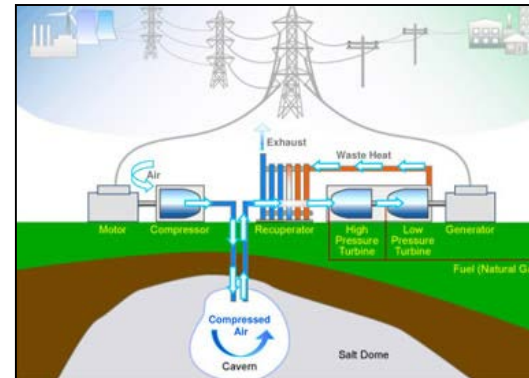
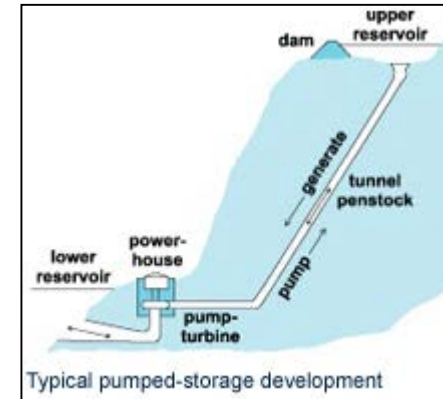
# Methods for Energy Storage

## Major Technologies:

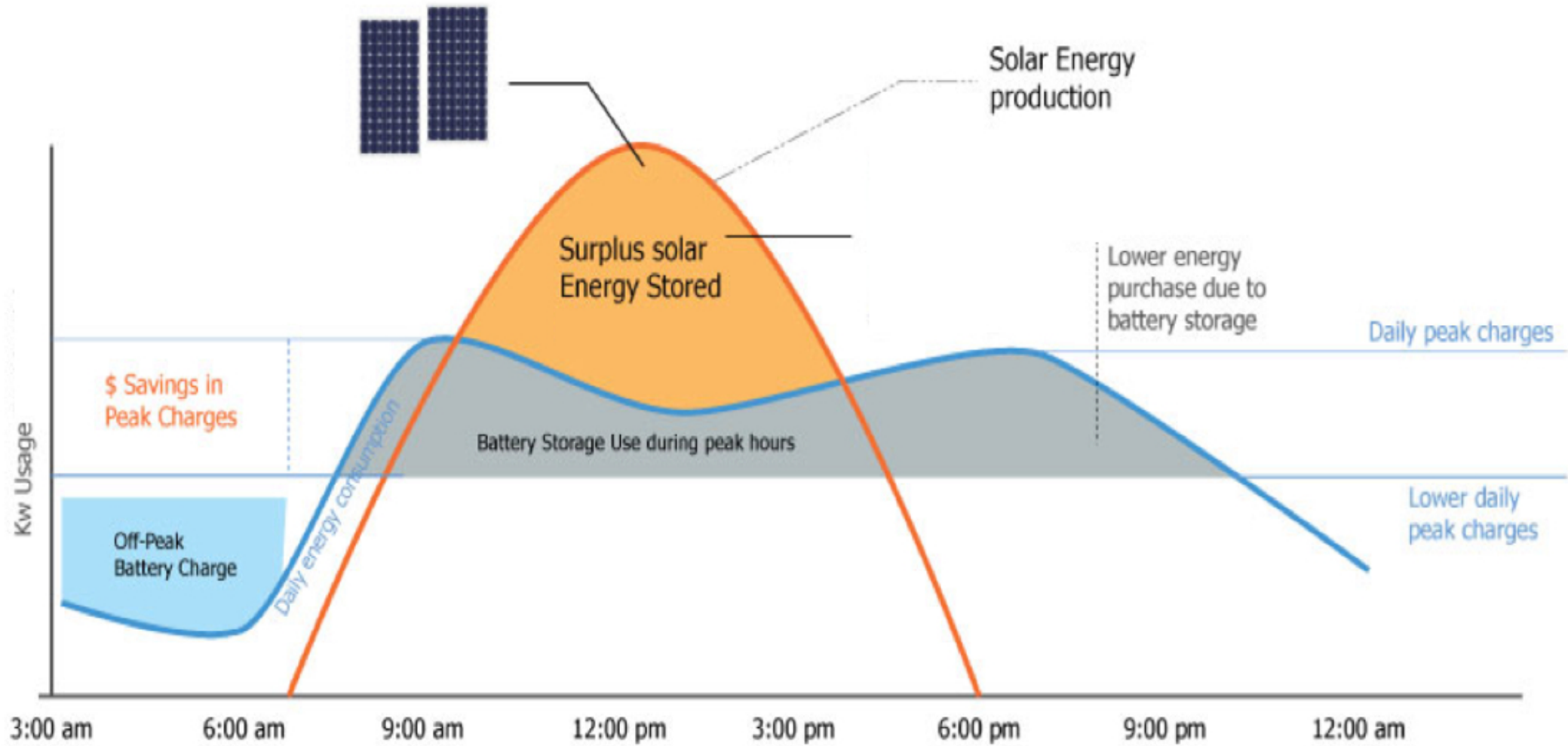
- Pumped Hydro (PHES)
- Compressed Air (CAES)
- Batteries

## Other Technologies:

- Thermal
- Electric Vehicles
- Flywheels
- Hydrogen
- Ultra-Capacitors
- Super Conducting Magnetic (SMES)

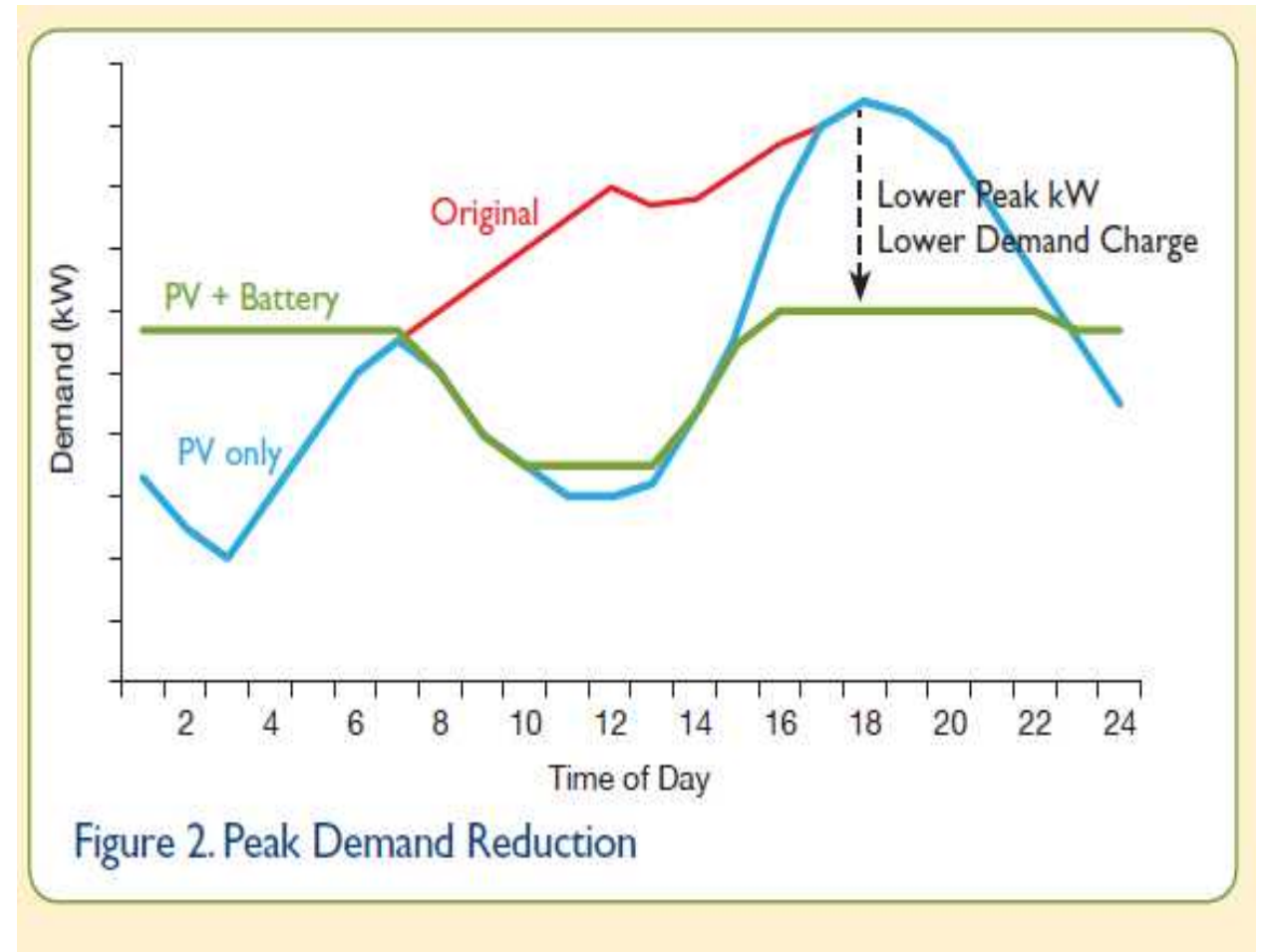


# Solar + Battery Storage



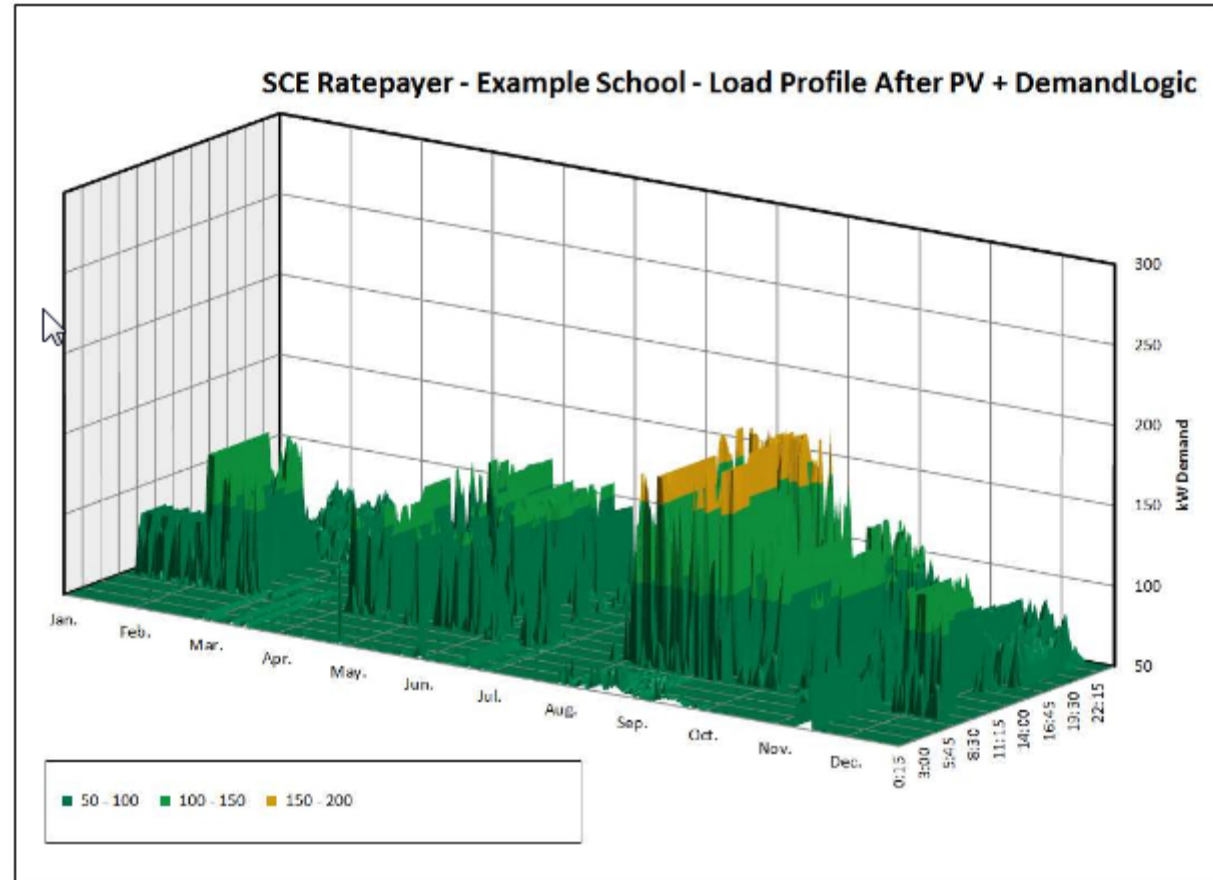
# Peak Demand Drivers

- Highest 15-minute interval of peak energy used monthly
- Most C&I customers, half of the bill is demand
- Timing of Peak (solar may not help)
- Large intermittent power spikes
- High peak power to average energy demand ratio



# Solar + Battery Storage

Commercial -- Load Profile with DemandLogic

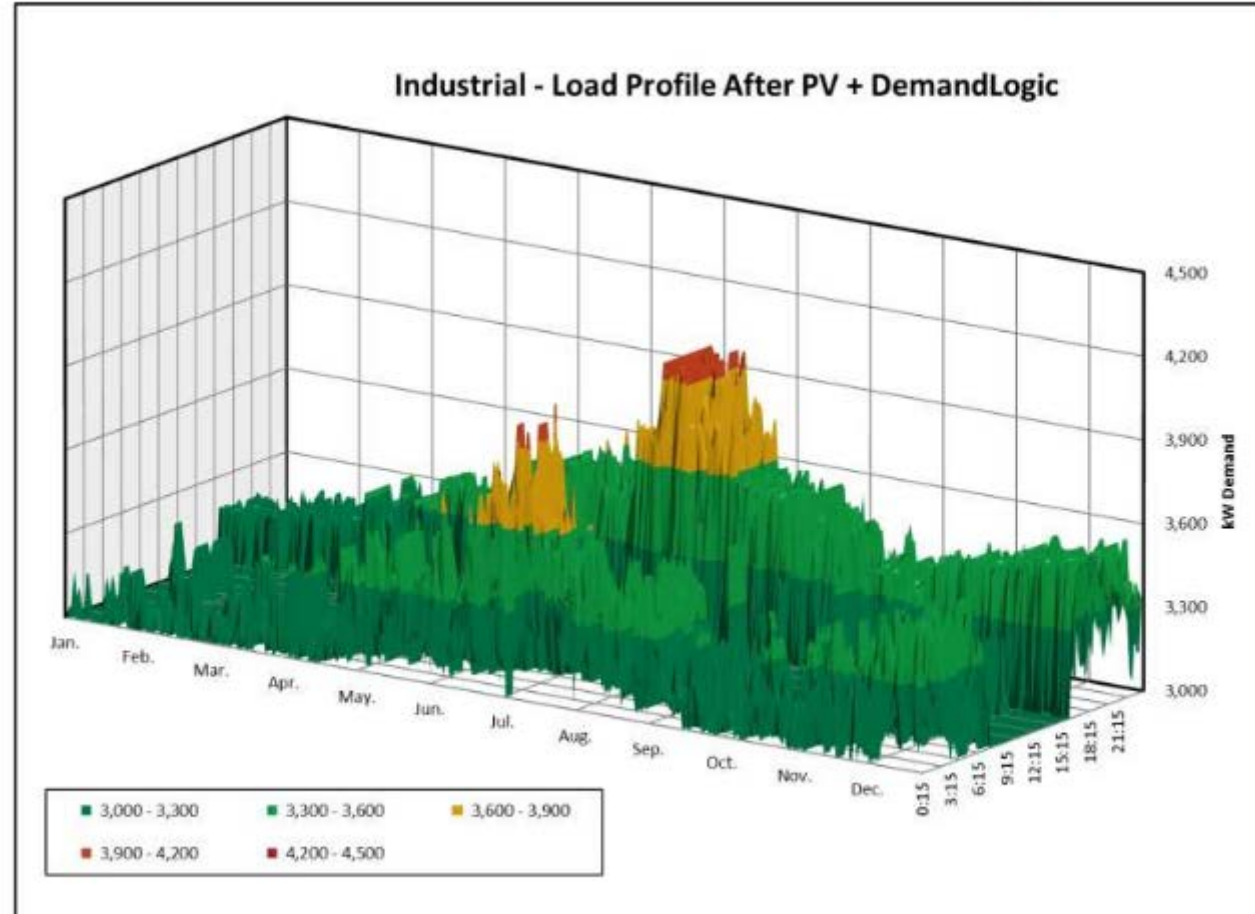


SolarCity



# Solar + Battery Storage

## Industrial – Load Profile with DemandLogic



SolarCity



# Closing Thoughts

- “So... What Happens When the Lights Go Out?”
  - Solar PV + Battery Storage Best Strategy
  - Solar will keep the distribution/lights on during the day (cloudy-30%)
  - Battery Storage will keep the system on during the night

